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The Mainstreaming of Climate Change and Variability Information into Planning and Policy Development for Africa

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Abstract

The economies of Africa, however, are predominantly dependent on rainfed agriculture and the associated industries. Current and future sustainable socio-economic development of the African nations will therefore heavily depend on the ability to cope with the current climate variability as well as adaptation to future climate changes. Some lessons and experiences that have been gained from many years of operations at the IGAD(Intergovernmental Authority on Development) Climate Prediction and Applications Centre (ICPAC) on issues related to mainstreaming climate change/variability information into the planning/policy development in the Greater Horn of Africa (GHA) are described. A short summary of the lessons and experiences from the Southern African Development Community (SADC) Drought Monitoring Centre (DMC-SADC); and the African Centre of Meteorological Applications for Development (ACMAD) is provided.

Keywords: Observations and climate database; climate information and delivery systems; regional climate outlook forums; capacity building; research, knowledge development and management

1. Introduction

Most of the continent of Africa has an arid or semi-arid climate with high space–time variability of rainfall, including frequent recurrences of extreme climate events [1]. The economies of Africa, however, are predominantly dependent on rainfed agriculture and the associated industries. The recurrences of climate extremes such as droughts, floods, cyclones, cold/warm spells, among other climate hazards, therefore often cause serious human suffering and huge economic losses that often wipe out decades of national development investments in water, agriculture, livestock, food security, investments, industries, tourism, infrastructure, health, shelter, transport and communication, among many national development initiatives. Such climate extremes often force many nations in the region to redirect most of their scarce resources planned for national development activities to disaster response and recovery including relief programmes.

Current and future sustainable socio-economic development of the African nations will therefore heavily depend on the ability to cope with the current climate variability as well as adaptation to future climate changes. This paper provides some lessons and experiences that have been gained from many years of operations at the IGAD (Intergovernmental Authority on Development) Climate Prediction and Applications Centre (ICPAC) on issues related to mainstreaming climate change/variability information into the planning/policy development in the Greater Horn of Africa (GHA). It also reflects, to some extent, the lessons and experiences from the other two major climate centres in Africa namely the Southern African Development Community (SADC) Drought Monitoring Centre (DMC-SADC); and the African Centre of Meteorological Applications for Development (ACMAD).

2. IGAD climate prediction and applications centre

Apart from the extreme climate events such as droughts and floods, the community in the Greater Horn of Africa is exposed to many other socio-economic hazards. Most of the countries can be classified as least developed with most of the society living on less than one dollar a day. Conflicts are plentiful in the region, and many of them are linked to disagreements over shared natural resources. Further, in terms of food, the region is one of the most insecure in the world being a recipient of about 40 per cent of the total global food relief each year.

It has been recognized that current and future sustainable socio-economic development of the region cannot be achieved without a regional ability to cope with the current climate variability as well as adaptation to future climate changes. It is in this regard that ICPAC was established in 2003 as a specialized institution of the Intergovernmental Authority on Development, which has seven member countries: Djibouti, Eritrea, Ethiopia, Kenya, Somalia, Sudan and Uganda, while Burundi, Rwanda and the United Republic of Tanzania are also members of ICPAC.

The major objective of ICPAC is to build the regional capacity required to support regional and national climate risk reduction strategies. Such climate risks include all those associated with both climate variability and change. In addition, ICPAC supports the integration of climate risks into the regional disaster risk reduction efforts including the implementation of the Hyogo Framework for Action (HFA). The centre was established in 1989 as a project of 24 African countries with support by the United Nations Development Programme (UNDP) and the World Meteorological Organization (WMO). The project had headquarters in Nairobi (Drought Monitoring Centre-Nairobi), and a sub-centre in Harare (Drought Monitoring Centre-Harare). The Harare centre now called

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DMC-SADC is currently based in Gaborone. The Summit of the IGAD Heads of State and Government held in October 2003 formally established ICPAC. The name was changed to ICPAC in order to better reflect all its mandates, missions and objectives within the IGAD system. Over the many years of operation ICPAC has been able to demonstrate that mainstreaming of climate information can significantly contribute to climate risk reduction and climate change adaptation for sustainable development.

3. ICPAC lessons and experiences

The ICPAC experiences and lessons highlighted in the following sections include those derived from the activities that have been undertaken at the centre since 1989 through support, close collaboration and cooperation with many partners and institutions worldwide.

3.1 Observations and climate database

Past and present climate data form the foundation for climate diagnosis, modelling, prediction, early warning and all applications of climate information. They are used to derive baseline and other climate statistics that allow variability and change patterns of climate extremes to be quantified. These statistics form the base for the understanding of the climate processes and various applications that are needed for mainstreaming climate information into sector-specific applications. Long-term climate observations are therefore also needed at the local and regional levels to understand and characterize local and regional extreme climate events. Such data are further required for calibration and validation of prediction models, among many other applications.

Inadequate density of meteorological stations is a key challenge to most applications and the mainstreaming of climate information for sustainable development in Africa, as is evident in Figure 1. Some data are available in Africa but have not been digitized. Some efforts are being undertaken in the region within the framework of WMO as well as other partners to not only improve data observations including the use of space-based technology, but also to rescue some of the undigitized data in Africa (Figure 2).

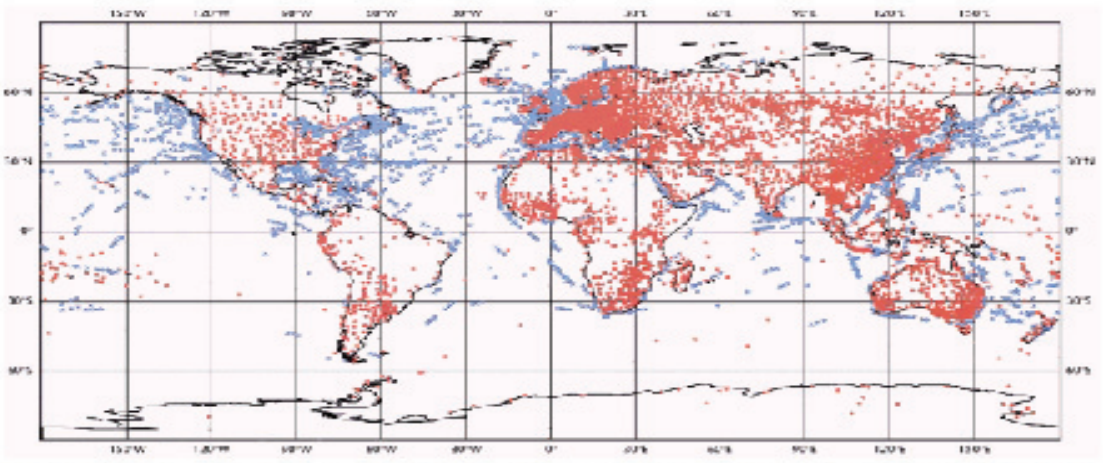

Figure 1. Clear evidence of data gaps in Africa (Source: **Global Climate Observing System** (GCOS))

3.2 Climate information and delivery systems

Most of the information required by users can be classified into three categories: information about past climate at various time and space scales; near real-time information; and future climate expectations at various time and space scales, including climate change. Some key questions that may be asked regarding the mainstreaming of climate information in disaster risk reduction and sustainable development plans in Africa include:

(a) Is the required climate information available for all users at all places on the continent?

(b) Is the available climate information timely, reaching the vulnerable national and local communities? If yes, why do climate extremes continue to threaten all livelihoods in new investments and development plans?

(c) How effective are the climate information delivery systems?

(d) Is the available climate information user friendly and in a language that can be well understood by all users?

(e) Do the users have the capacity to translate the provided climate information into sector-specific risk information?

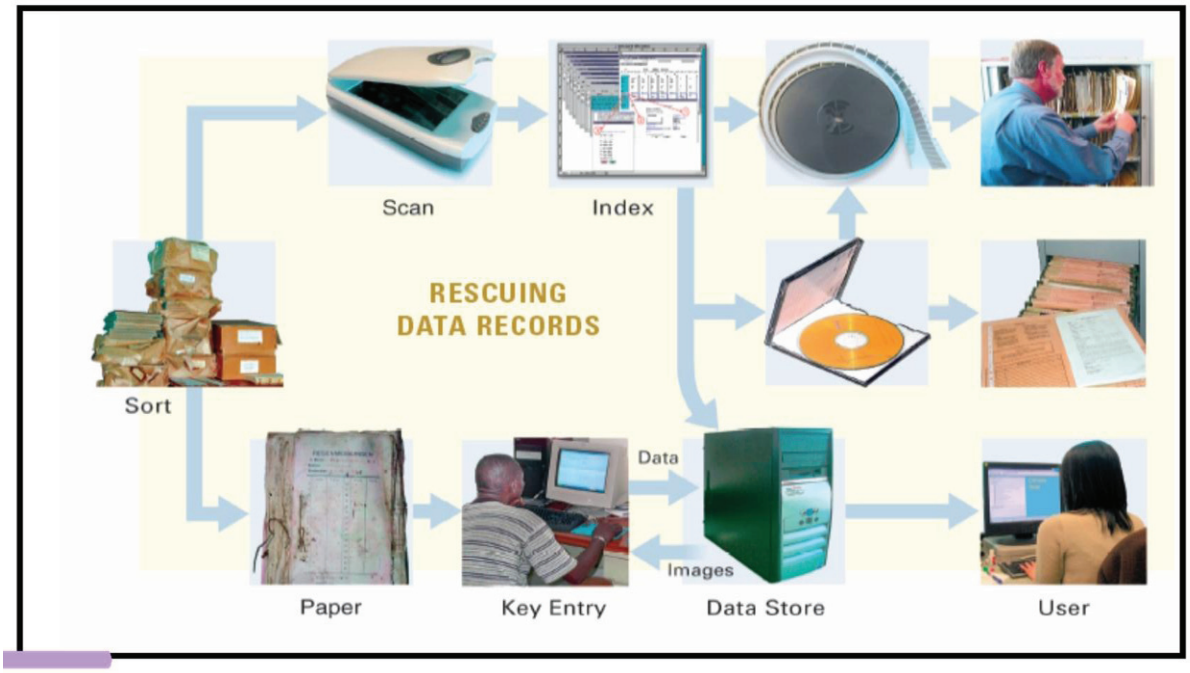

Figure 2. Some ongoing regional data rescue initiatives

(f) What are the attitudes of the climate information users?

(g) Do the local users have some indigenous knowledge system that they have been using for generations and that would require climate experts to have some forums for proving that they have better climate risk reduction tools and methods?

(h) How can we collectively do things differently in partnerships to maximize the use of available climate information?

These are some of the a million-dollar questions that must be addressed in order to enhance the use of available climate information for disaster risk reduction and sustainable development. This will require not only improved networks, but also some strategic planning supported by clear communication policies.

In the ICPAC region, the Network of Climate Journalists of the Greater Horn of Africa has been initiated with the aim of improving the dissemination of climate information to the users in the GHA subregion. This network was formed out of the realization that there was too much acrimony and misunderstanding between climate scientists and the media. Out of this experience, the two professions realized that, in fact, the end-user of climate information (the public) was on the receiving end of all the troubles and squabbles. Through the network assessments, it has been realized that whatever was generated by the climate scientists was not reaching the end-user, and that the avenue through which this information could pass was blocked by the fear of jargon, the fear of lifting a telephone handset and calling the meteorological services or just being too lazy to deal with the more mundane stories. As often said, few people wanted to deal with figures and mind-wracking terminologies.

On the other hand the scientists viewed the media as people who do not understand their work, who were always there to settle unforeseen scores and who only wanted to depict the bad side and not what was happening. Other new climate information dissemination opportunities in the region are available through the use of RANET (Radio and Internet for the Communication of Hydro-Meteorological Information for Rural Development) (Figure 3). Another major recent climate information delivery system in Africa, especially for seasonal climate outlook risks, is the Regional Climate Outlook Forum (RCOF). Some RCOF details are given in the next section.

3.3 Regional Climate Outlook Forums

Regional Climate Outlook Forums have been running in many parts of the world since 1967 with the aim of providing consensus early warning seasonal climate information for reducing climate-related risks in support of sustainable development efforts of the specific regions. The RCOF process was initiated by the WMO Climate Information and Prediction Services (CLIPS) project, in collaboration with National Meteorological and Hydrological Services (NMHSs) and regional/international climate centres, among many other partners. The RCOF process in Africa includes a pre-RCOF capacity-building component for climate scientists to improve their understanding of the regional climate processes; for the improvement of models and prediction of regional climate; for verification and assessment of prediction skills; and for addressing the benefits of RCOF products. These are attended by scientists from the NMHSs of the specific regions. Technical support is provided by experts from the regional/international climate centres and local universities, among others.

The RCOF processes also often have user-specific workshops to build the capacity of experts from various socio-economic sectors. The users also provide their sector-specific benefits and verification of the previous RCOF products. They further develop mitigation strategies for the new RCOF products. Details on RCOFs may be obtained from Berri et al. [2]; Hellmuth [3]; Patt et al.[4]; Julie and Céron [5]; Ogallo et al. [6]; Thomson et al. [7], among others.

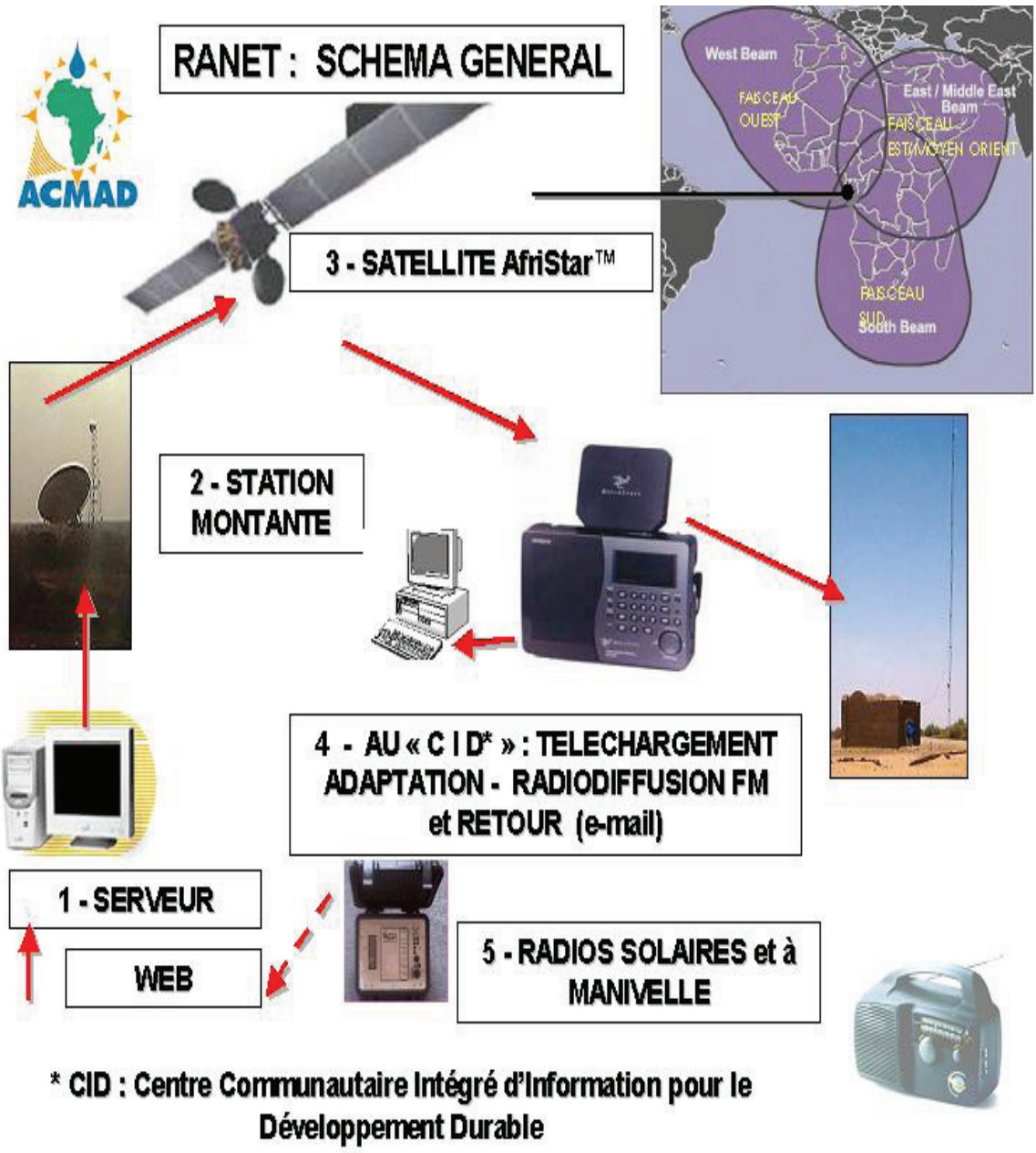

Figure 3. An example of Radio-Internet climate information dissemination system (RANET)

Since 1998, ICPAC has held RCOFs for the Greater Horn of Africa region. Two RCOFs are organized by ICPAC each year before the onset of the two main rainfall seasons that are concentrated within the months March-May and October-December. Since the inception, the ICPAC RCOFs, commonly referred to as the Greater Horn of Africa RCOFS (GHACOFS), have provided an opportunity to bring together users from various socio-economic sectors such as agriculture, livestock and food security; energy and hydropower; water resources; health; disaster management; tourism and wildlife; settlement including urban-related risks; marine and aquatic resources; conflict early warning; and economic development, among many others. By the end of March 2010, twenty-five formal GHACOFS had been organized by ICPAC and partners. In addition, ICPAC organizes virtual GHACOFs for June-August season, which is the main rainfall period for parts of the region that are far north the equator. These forums have been largely virtual due to lack of funding. It is expected that from June-July 2010 formal RCOFs will be held during for the June-August rainfall season through funding from the African Development Bank. This effort is expected to extend such activities to national levels and reach the vulnerable communities that require such information the most.

These forums have made enormous contributions to the improvement of the quality of the seasonal rainfall outlooks and dissemination of climate information and prediction products for early warning disaster management, and to the general mainstreaming of climate information and products in some sustainable development efforts in the subregion.

3.4 Capacity-building needs

The recent Intergovernmental Panel on Climate Change (IPCC) assessment [8] has noted that Africa is the most vulnerable region to both climate variability and change. Africa also has the least capacity to develop, generate, disseminate and use effectively climate information in climate risk reduction and management. The need for capacity-building for mainstreaming climate information in various development sectors is therefore a key priority in Africa. Capacity-building programmes have driven many WMO programmes over many years. Parties to the United Nations Framework Convention on Climate Change (UNFCCC) have also recognized the need to assist developing countries to respond to climate change on such issues as technology transfer, national communications and funding. Capacity-building cuts across many of the issues. Some comprehensive reviews of capacity-building for the developing countries were initiated at the Conference of the Parties to the UNFCCC in 2004. Most countries in the region have reported their needs and priorities for capacity-building in areas related to climate change in Africa. The capacity-building issues that have been identified within the framework of UNFCCC include the following, among others:

(a) Systemic level capacity-building needs for:

(1) Policy formulation, planning and integration of climate change;

(2) Mainstreaming climate change into sustainable development strategies;

(3) Establishing priorities at the sectoral level;

(4) Enforcing policy instruments;

(5) Raising public awareness and participation of key stakeholders;

(b) Institutional level capacity-building needs for:

(1) Establishing strong climate change units or departments with clear responsibilities and duties;

(2) Research and systematic observation;

(3) Strengthening the capacity for the emissions data collection and research, for the operation of greenhouse gas inventories and for developing adaptation and mitigation responses and strategies;

(4) Formulating programmes and projects;

(5) Undertaking vulnerability assessments and preparation of adaptation strategies;

(c) Individual level needs for:

(1) Trained personnel to respond to the human resources needs of the institutions being established, improvement of negotiation skills and strengthening of negotiating teams;

(2) Capacity in technology transfer, negotiation and management, particularly related to the Clean Development Mechanism;

(3) Capacity to develop programmes and projects on climate change;

(4) Enhancement of the analytical capacity of experts, policymakers and decision-makers.

Lack of climate change awareness and the low capacity of Africa to cope with climate change has been noted in many recent reports. Capacity development and awareness creation are therefore critical components of any climate change adaptation strategy for Africa. African institutions at the continental, regional, subregional and national levels should play leading roles in their respective competitive advantage capacity-building areas.

There are a number of institutions across Africa that regularly hold training courses as an accompaniment to capacity-building activities in the area of climate variability and change. The World Meteorological Organization has also designated several regional meteorological training centres for strengthening capacity. For building the capacity of Africa for climate change adaptation, partnerships will be required among these WMO-related institutions and a wide range of stakeholders from governments, non-governmental organizations, the private sector, academia and local communities. There is a need to enhance the capacity of these African institutions to enable them effectively to provide the required leadership at various levels in Africa. The major regional organizations in Africa include ACMAD; ICPAC; DMC-SADC; the Agrometeorological and Hydrometeorological (AGRHYMET) Regional Centre; and the Regional Center for Mapping of Resources for Development (RCMRD).

3.5 Research, knowledge development and management

The investment by African governments in research, science and technology is very low, yet science and technology are key to the knowledge required for African sustainable development. It is therefore not surprising that knowledge of the African climate variability and change processes is still relatively low. This also applies to multidisciplinary knowledge required to customize different end-user climate application products that are required for effective mainstreaming of climate information into sector-specific plans. New tools and methods are also required for improving the quality of climate information required by the diversity of

users at the local level. These include the capacity to downscale climate information currently available from the advanced climate centres in the West, such as the WMO Global Producing Centres (GPCs), to usable regional/local climate products and the improvement of the ability of the users to downscale and translate such information into useable sector-specific climate risk information.

Collaboration, networking and coordination among the universities, major research centres, and African climate centres are required to support climate adaptation research in Africa. Some of these multidisciplinary research questions are being addressed within the framework of some of the RCOFs associated pilot projects.

4. Conclusions

Most African countries have an arid or semi-arid climate with a high degree of climate variability. Yet most of the economies of Africa rely on rainfed agriculture and the associated industries. No sustainable socio-economic development can be achieved in the continent without the mainstreaming of climate information into national and regional development strategies to cope with current climate variability as well as adaptation to future climate change at local levels. The mainstreaming strategies should be an integral component of national and regional disaster risk reduction including the implementation of the Hyogo Framework for Action. Key challenges in Africa include, among others, limitations in climate observations and the required data; lack of adequate monitoring and early warning systems; lack of skilled multidisciplinary human resources, hardware, software and many other relevant science and technology applications; limited research to understand local/regional processes and their interaction with the global systems; environmental degradation and over-utilization of natural resources; limited communication strategies for climate risk information including community-based information exchange and networking; awareness, training and education of the public regarding the potential impacts of their day-to-day actions on the environment and the need to protect the environment; the lack of adequate and integrated policies for environmental disaster preparedness; and inadequate resources.

There is also a need for good understanding of the implications of past, present and future protocols and policies on sustainable socio-economic development in the African countries.

The increasing needs for specialized climate information and the current challenges in providing such products call for some new approaches that will include partnerships, collaboration, networking and coordination at international, regional, national and community levels.

References

[1] Ogallo, L.A, Dynamics of Climate Change in East Africa. Proceedings of Indian Academy of Sciences. 102 (1993) 203.

[2] Berri, G.J., P.L. Antico and L. Goddard, Evaluation of the Climate Outlook Forum seasonal precipitation forecasts of southeast South America during 1998-2002. International Journal of Climatology. 25 (2005) 365.

[3] Hellmuth, M.E., A. Moorhead, M.C. Thomson and J. Williams, eds, Climate Risk Management in Africa: Learning from Practice, International Research Institute for Climate and Society (IRI), Columbia University, New York, 2007.

[4] Patt, A.G., L. Ogallo and M. Hellmuth, Learning from 10 Years of Climate Outlook Forums in Africa. Science. 318 (2007) 49.

[5] Julie, A. and J.-P. Céron, Seasonal forecasting in West Africa : A strategic partnership for a sustainable development of a cross boundary river catchment, in: Elements for Life. Tudor Rose and WMO, Geneva, 2007.

[6] Ogallo, L., P. Bessemoulin, J.-P. Céron, S. Mason and S.J. Connor, Adapting to Climate Variability and Change: The Climate Outlook Forum process. WMO Bulletin. 57 (2008) 93.

[7] Thomson, M.C., S.J. Mason, T. Phindela and S.J. Connor, Use of rainfall and sea surface temperature monitoring for malaria early warning in Botswana. American Journal of Tropical Medicine and Hygine. 73 (2005) 214.

[8] Intergovernmental Panel on Climate Change, Climate change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller, eds), Cambridge and New York, Cambridge University Press, 2007.